

Discussion Papers

1008

Sven Heitzler • Christian Wey

**Raising Rivals' Fixed (Labor) Costs:
The Deutsche Post Case**

Berlin, May 2010

Opinions expressed in this paper are those of the author(s) and do not necessarily reflect views of the institute.

IMPRESSUM

© DIW Berlin, 2010

DIW Berlin
German Institute for Economic Research
Mohrenstr. 58
10117 Berlin
Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
<http://www.diw.de>

ISSN print edition 1433-0210
ISSN electronic edition 1619-4535

Available for free downloading from the DIW Berlin website.

Discussion Papers of DIW Berlin are indexed in RePEc and SSRN.
Papers can be downloaded free of charge from the following websites:

http://www.diw.de/de/diw_01.c.100406.de/publikationen_veranstaltungen/publikationen/diskussionspapiere/diskussionspapiere.html
<http://ideas.repec.org/s/diw/diwwpp.html>
http://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalbrowse&journal_id=1079991

Raising Rivals' Fixed (Labor) Costs: The Deutsche Post Case*

Sven Heitzler[†] Christian Wey[‡]

May 2010

Abstract

We analyze the bargaining problem of an incumbent firm and a union when the wage contract becomes generally binding. Our main application relates to competition among operators of mail delivery networks. We describe the Deutsche Post case which highlights the raising rivals' costs incentive and its consequences resulting from labor laws that make collective agreements generally binding. We show that minimum wages implemented by means of extension regulation are an effective deterrence instrument which frustrates both market entry as well as investments into the build-up of a mail delivery network.

JEL-Classification: L12, J52, K31

Keywords: Minimum Wages, Postal Services, Collective Bargaining, Raising Rivals' Costs

*We would like to thank Justus Haucap, Roman Inderst, Jean-Marie Lozachmeur, Beatrice Pagel, Patrick Rey, Irina Suleymanova and participants of the 6th Conference on "Regulation, Competition, and Universal Service in the Postal Sector" (Toulouse, 2010) for helpful comments. We gratefully acknowledge financial support by the German Science Foundation for the research project "Market Power in Vertically Related Markets" (grant WE 4228/2-1). This paper also benefited from Christian Wey's collaboration in the research project "Unionized Oligopolies" also financed by the German Science Foundation.

[†]Deutsches Institut für Wirtschaftsforschung (DIW) Berlin; sheitzler@diw.de.

[‡]University of Düsseldorf, Düsseldorf Institute for Competition Economics (DICE); wey@dice.uni-duesseldorf.de.

1 Introduction

In this paper we analyze the bargaining problem of an incumbent firm and a union when a collectively agreed upon wage contract becomes the minimum wage in the entire industry. This is typically the case in Germany, where collective wage agreements between a union and an employers' association can be made compulsory even for independent employers through so-called extension rules.¹

In contrast to previous works on raising rivals' (wage) cost strategies we analyze the case where labor costs are mainly fixed operating costs. We consider a market with an incumbent firm and an entrant firm. The employees of the incumbent firm are represented by a union, while none of the workers of the entrant firm is organized. The incumbent firm and the union bargain about a collective wage agreement. We compare two labor market regimes depending on whether or not the agreed upon wage becomes generally binding for all employees in the industry. Our results highlight the raising rivals' cost incentives of both bargaining parties (the incumbent firm and the labor union) when an extension rule is in place. When firms' wage bills constitute fixed costs, then generally binding (minimum) wages become an extremely effective deterrence device such that even a more efficient rival can be deterred from entering the industry.

Our main application is the Deutsche Post case which nicely highlights the parties' incentives and the consequences of labor laws which make collective agreements generally binding. In Germany, the Posted Workers Act of 1996 allows the Federal Ministry of Labor to implement minimum wages in certain service industries, as e.g., postal services. In contrast to minimum wage legislations in other countries, minimum wages in Germany are based on existing collective contracts which are typically the outcome of negotiations between the established industry union and incumbent firms (organized within an employer association). The Federal Ministry of Labor can then decide to declare such an existing collective contract generally binding. Quite obviously, that procedure tends to neglect new and entrant firms' (and their employees') interests. And even worse, the procedure of declaring collective wage contracts generally binding may be used strategically by the incumbent players to directly harm entrant firms. This is exactly what

¹German labor market institutions and extension regulations are described in Haucap et al. 2006. Below we identify the key elements of labor laws in Germany which implement industry-specific minimum wages via extension regulations.

happens in the Deutsche Post case.

Our paper is related to Williamson (1968) who showed that an incumbent firm may accept high wage rates if this also raises rivals' costs (see also Haucap et al. 2001). Precisely, Williamson (1968) analyzed the so-called Pennington case and he argued that an industry-wide wage contract which increases the cost of relative labor-intensive firms to a larger extent than the costs of relative capital-intensive firms can be used to force labor intensive firms to withdraw from the market. Quite generally, the raising rivals' cost literature assumes that the strategic variable (as, e.g., a generally binding minimum wage rate) impacts directly on firms' variable costs (see Salop and Scheffman 1983, 1987). In those settings a necessary condition for making a raising rivals' cost strategy profitable is that the rival firms' labor productivity (in the case of wage being the strategic variable) is smaller than the firm's labor productivity which executes the anticompetitive practice. As a consequence, overall productive efficiency may very well increase as the more productive firm gains market shares while less productive firms lose market shares.

Our analysis of a setting where labor costs are fixed costs reveals that a raising rivals' costs strategy may also be profitable when rival firms are more efficient. Hence, the adverse effects of labor laws which make wages generally binding are likely to be more pronounced when firms' labor costs are fixed.

We also examine how the presence of wage extension regulations impacts on the entrant firm's incentives to invest into its mail delivery network which determines the entrant's coverage. We show that an entrant may never invest into building up its own delivery network irrespectively of the effectivity of its investment cost function. If investments take place, then an entrant will enter with a network which entails a smaller coverage when compared with the case without an extension rule. Hence, besides more standard (static) anticompetitive effects, minimum wage legislation unfolds additional adverse dynamic effects on the entrant's willingness to invest into the coverage of its own mail delivery network.

Our paper contributes to the literature which analyzes the interplay between monopolized labor markets and oligopolistic product markets ("unionized oligopolies"). Since Dewatripont (1987, 1988) and Horn and Wolinsky (1988a,b) this literature has been focusing on both the properties of the union-firm bargaining problem and labor market institutions. Accordingly, our model delivers new insights on the nature of union-firm bargaining when labor costs are fixed

costs and the effects of labor laws which make wage contracts generally binding.

Our paper is related to the literature on entry barriers (Dixit 1979). Most importantly, we extend the paper by Rogerson (1984) who shows that under symmetric cost conditions a dominant firm has incentives to raise fixed entry cost. In Rogerson (1984) the level of fixed entry costs is exogenously given, while in our analysis the fixed labor costs of operating a mail delivery network are the outcome of negotiations between the union and the incumbent operator.

The paper is organized as follows. In Section 2 we introduce the set-up of our model and in Section 3 we derive and compare the industry equilibria depending on whether or not an extension regulation is in place. In Section 4 we examine how the different labor market regimes affect the entrant's incentives to invest into the coverage of its mail delivery network. Section 5 describes the legal foundations of collective bargaining in Germany and the regulations which transform collective wage agreements into generally binding minimum wages. Section 6 provides an extensive discussion of the Deutsche Post case which highlights the raising rivals' cost incentives and their consequences when the collective wage agreement becomes generally binding. Finally, Section 7 concludes.

2 The Model

We assume an incumbent firm $i = 1$ and an entrant firm $i = 2$. We think of the firms as postal network operators which offer mail delivery services. The incumbent firm operates a delivery network by employing a fixed volume of mailmen services, $\eta_1 > 0$, which guarantees a certain mail service quality (e.g., maximum delivery transit times). Hence, the incumbent's labor costs of operating its mail delivery network are fixed costs which are independent of the overall mail volume. For a given wage rate w_1 , the incumbent's total labor costs are then given by $\eta_1 w_1$. In addition, the incumbent's (non-labor) marginal costs of mail delivery service are given by $c_1 = c \geq 0$.

With regard to the entrant firm's costs we also assume that labor costs for operating its own delivery network constitute fixed costs with $\eta_2 w_2$.² The entrant has (non-labor) marginal costs

²We focus on competition between delivery network operators. By that we abstract from the issues of access regulation which may counter competitors' incentives to set-up own delivery networks (as, e.g., in the UK where relatively low access prices prevail). See Armstrong (2008) for a model of optimal access prices in postal service

of $c_2 = c + \Delta$, where Δ stands for the relative cost efficiency of the entrant firm. The relative cost efficiency of the entrant increases with lower values of Δ . We suppose that the entrant firm's mail delivery network is more efficient when compared with the incumbent firm's delivery technology, so that $\eta_1 \geq \eta_2$ holds (we measure the relative network efficiency of the entrant by the ratio $\eta_2/\eta_1 \leq 1$, where a lower value indicates a higher efficiency level).

We assume a linear inverse demand for mail services $p(X) = a - X$, with $a > c$, where $X := x_1 + x_2$ stands for the sum of mail services offered by the incumbent, x_1 , and the entrant firm, x_2 , respectively. Firms determine their mail service supplies x_i (e.g., through outlets and sorting capacities) which are perceived as homogenous by consumers.³ In the following it is useful to define $\alpha := a - c$.

All workers of the incumbent firm are represented by a union which maximizes the wage bill $L = w_1\eta_1$ of its members. We suppose that all workers in the sector have the same reservation wage $\rho \geq 0$ (which is typically determined by unemployment benefits). We assume collective wage bargaining between the incumbent firm and the union. The union's disagreement point is then given by $\rho\eta_1$. We apply the Nash bargaining solution to solve for the wage settlement (Nash 1950).

Workers of the entrant firm are assumed to be not organized in a union. Hence, in the absence of an extension rule, the entrant is able to hire workers at their reservation wage ρ .

We consider the following two stage game: In the first stage, the incumbent firm and the union bargain about the wage rate. In the second stage, the incumbent and the entrant simultaneously determine their mail volume capacities (i.e., compete à la Cournot).⁴

We distinguish two labor market regimes depending on whether or not an extension rule is in place. If no extension rule exists, then the entrant firm pays the reservation wage to its employees while the incumbent bargains with the union about the wage rate, \hat{w}_1 , which only

markets.

³Because of the linearity of our model we can reinterpret Δ as measuring vertical product differentiation (see Häckner 2000).

⁴We interpret Cournot competition in the sense of Kreps and Scheinkman (1983) such that the postal operators are assumed to set first their mail capacities and then compete in prices. As shown by the authors, that game yields the Cournot outcome if products are homogeneous. In addition, we suppose that both firms' mail delivery networks are sufficiently large to guarantee a certain delivery quality for their supplied mail volumes.

applies to its own employees. In contrast, if an extension rule is in place, then the entrant firm must pay the (minimum) wage, \bar{w} , which is determined jointly by the union and the incumbent firm.

At this point some more general remarks are helpful to specify a meaningful parameter range for our linear model. Let us denote the net revenue of firm i by $R_i = [p(X) - c_i] x_i$ for $i = 1, 2$. Suppose a unique interior Nash-Cournot equilibrium (x_1^*, x_2^*) exists with

$$x_i^* = \arg \max_{x_i} R_i(x_i, x_j^*), \text{ for } i = 1, 2, i \neq j.$$

As products are homogenous, differences in firms' equilibrium quantities only depend on Δ and are independent of the wage rate. Quite generally, in a Cournot duopoly model increasing the relative cost efficiency of one firm leads to a relative increase of the firm's equilibrium output; i.e., $\partial x_1^*/\partial \Delta > 0$ and $\partial x_2^*/\partial \Delta < 0$ holds, with $x_1^* = x_2^*$ at $\Delta = 0$.⁵ We specify that $x_2^*(\Delta) > 0$ and $x_1^*(\Delta) > 0$ holds for all admissible Δ , so that the range of Δ is restricted to an interval which guarantees strictly positive output levels for both firms.

Denote now the optimal net revenue of firm i under duopoly by $R_i^D := [p(x_1^* + x_2^*) - c_i] x_i^*$ (where the superscript "D" stands for the duopoly outcome in the product market). As we assumed constant marginal costs, we obtain $dR_1^D/d\Delta > 0$ and $dR_2^D/d\Delta < 0$, with $R_1^D = R_2^D$ if $\Delta = 0$.

Our approach implies that the wage rate only affects firms' profit levels but not optimal quantity choices. We assume that workers' reservation wage is sufficiently low such that $R_2^D - \eta_2 \rho > 0$ holds. For all admissible Δ , this assumption ensures that the entrant firm always finds it profitable to enter the market whenever it pays the reservation wage to its employees operating the mail delivery network. Similarly, we assume that $R_1^D - \eta_1 \rho > 0$ holds for all admissible Δ , so that the incumbent operates with a strictly positive profit if it pays the reservation wage under duopoly. This assumption also ensures that the joint surplus of the union-incumbent relationship is strictly positive implying, in turn, a negotiated wage strictly larger than workers' reservation wage.

Given that an extension rule exists, the entrant firm must pay the generally binding wage rate, \bar{w} , which is the outcome of bilateral bargaining between the union and the incumbent firm.

⁵See Vives (1999) for a general treatment of the Cournot oligopoly model and the conditions which ensure "intuitive" comparative statics.

Clearly, as long as the entrant's net revenue R_2^D is not smaller than its fixed labor costs, $\bar{w}\eta_2$, the entrant will enter the market. We denote the limit wage, where $R_2^D = w\eta_2$ holds, by \tilde{w} . Note that $d\tilde{w}/d\Delta < 0$ and $d\tilde{w}/d\eta_2 < 0$ which says that the limit wage decreases as the entrant's cost efficiency or its network efficiency decreases, respectively.

If $\bar{w} \geq \tilde{w}$, then the entrant does not enter the market and the incumbent realizes the monopoly net revenue $R_1^M := R_1(x_1^M)$, with $x_1^M = \arg \max_{x_1} [p(x_1) - c_1] x_1$ (where the superscript "M" stands for the monopoly outcome in the product market). Note that R_1^M is independent of both Δ and \bar{w} . We now invoke the assumption that $R_1^M > \tilde{w}\eta_1 \equiv (\eta_1/\eta_2)R_2^D$ which guarantees the existence of a limit wage \tilde{w} which leaves the incumbent with a strictly positive payoff at the limit wage. This assumption guarantees scope for entry deterrence as, otherwise, the incumbent would always be better off under the duopoly outcome.

Taking these considerations together, we can formulate the following assumption which we maintain throughout the entire analysis.

Assumption 1. *We invoke the following parameter restrictions.*

- i) $\Delta \in (-\alpha, \frac{\alpha}{2})$ which ensures that both firms' equilibrium quantities are strictly positive, whenever the entrant firm enters the market.*
- ii) $\rho < \min \left\{ \frac{R_1^D}{\eta_1}, \frac{R_2^D}{\eta_2} \right\}$ which ensures that both the incumbent and the entrant firm make strictly positive profits if they pay the reservation wage to their employees.*
- iii) $\frac{\eta_2}{\eta_1} > \frac{R_2^D}{R_1^M}$ which guarantees that the incumbent's profit is strictly positive at the limit wage, \tilde{w} .*

Part *iii)* of Assumption 1 mirrors the fact that entry deterrence is in principle possible as the incumbent realizes monopoly net revenues which are larger than the wage bill at the limit wage. This constellation is guaranteed by imposing an upper limit on the relative network efficiency of the entrant. However, the share the incumbent may get from the realized monopoly revenues may be quite small when the limit wage becomes large.

3 Equilibrium Analysis

We first analyze the equilibrium when no extension rule is in place. Then, we turn to the case where an extension rule makes the wage agreement between the incumbent and the union

generally in the entire industry. Finally, we compare the results under both labor market regimes.

Bargaining without extension rule. We first analyze the equilibrium when no extension rule is in place. The profit functions of the incumbent and the entrant are given by

$$\pi_1 = (\alpha - X)x_1 - w_1\eta_1 \text{ and } \pi_2 = (\alpha - \Delta - X)x_2 - w_2\eta_2,$$

respectively, from which we obtain the first-order conditions

$$\alpha - 2x_1 - x_2 = 0 \text{ and } \alpha - \Delta - 2x_2 - x_1 = 0,$$

and hence, the optimal quantities

$$x_1^* = \frac{\alpha + \Delta}{3} \text{ and } x_2^* = \frac{\alpha - 2\Delta}{3}.$$

Hence, $R_1^D = [(\alpha + \Delta)/3]^2$ and $R_2^D = [(\alpha - 2\Delta)/3]^2$. In the absence of an extension rule, the entrant pays the reservation wage ρ to its workers. Hence, the entrant firm's equilibrium profit becomes

$$\hat{\pi}_2^D = R_2^D - \rho\eta_2. \quad (1)$$

We now turn to the first stage of the game, where the union bargains with the incumbent firm about the wage rate w_1 . We apply the Nash bargaining solution which requires that the joint surplus $R_1^D = [(\alpha + \Delta)/3]^2$ is shared equally relative to the union's disagreement point $\rho\eta_1$ (the incumbent's disagreement point is zero). Hence, the equilibrium wage bill, $\hat{w}_1\eta_1$, must fulfill

$$R_1^D - \hat{w}_1\eta_1 = \hat{w}_1\eta_1 - \rho\eta_1. \quad (2)$$

The following proposition follows immediately from solving Equation (2) for the wage rate, \hat{w}_1 , the incumbent's profit and the union's wage bill.

Proposition 1. *Suppose that no extension rule exists. Then the entrant firm always enters the market, pays its employees the reservation wage and realizes the profit level $\hat{\pi}_2^D = R_2^D - \rho\eta_2$. In equilibrium the union and the incumbent settle on the wage rate*

$$\hat{w}_1 = \frac{1}{2} \frac{1}{\eta_1} [R_1^D + \rho\eta_1]$$

which implies a profit level of

$$\hat{\pi}_1^D = \frac{1}{2} [R_1^D - \rho\eta_1], \quad (3)$$

for the incumbent, while the union's wage bill is

$$\hat{L} = \frac{1}{2} [R_1^D + \rho\eta_1] .$$

By Assumption 1, the entrant firm enters the market with a strictly positive quantity and receives strictly positive profits. Comparing both firms' profit levels (1) and (3), we observe that the entrant typically realize a higher profit level than the incumbent. To see this, suppose that both firms are equally cost efficient (i.e., $\Delta = 0$). Then comparison of (1) and (3) yields that $\hat{\pi}_2^D > \hat{\pi}_1^D \Leftrightarrow \rho\eta_2 < (1/2)(R_1^D + \rho\eta_1)$, where the latter inequality holds always as we assumed $\eta_1 \geq \eta_2$ and $R_1^D > \rho\eta_1$. The obvious reason for this result is that the incumbent must share its surplus with the union, while the entrant pays its workers' the reservation wage. However, the incumbent's profit can be larger than the entrant's profit if the entrant's cost efficiency is sufficiently small (i.e., Δ positive and sufficiently large).

Bargaining with extension rule. In the case of an extension rule, the outcome of the negotiations between the union and the incumbent firm determines the minimum wage rate, \bar{w} , which is binding for all firms in the industry. With an extension rule in place, firms' optimal strategies in the second stage remain unaffected as long as the entrant firm finds it optimal to enter the market. This is the case as long as $\pi_2 = R_2^D - \bar{w}\eta_2 > 0$ holds. However, if the agreed upon wage rate does not fall short of the limit wage, $\bar{w} \geq \tilde{w}$, then the incumbent sets the monopoly output level, $x_1^M = \alpha/2$, and realizes the monopoly net revenues, $R_1^M = (\alpha/2)^2$, in the product market. Depending on the generally binding wage rate, \bar{w} , the incumbent firm's profit function is then given by

$$\pi_1(\bar{w}) = \begin{cases} R_1^M - \bar{w}\eta_1 = (\alpha/2)^2 - \bar{w}\eta_1 & \text{for } \bar{w} \geq \tilde{w} \\ R_1^D - \bar{w}\eta_1 = [(\alpha + \Delta)/3]^2 - \bar{w}\eta_1 & \text{for } \rho \leq \bar{w} < \tilde{w}. \end{cases}$$

Let us assume for a moment that bargaining only occurs over a certain wage rate. We can then state the corresponding bargaining frontier, $\Lambda(\pi_1)$, which gives the maximum payoff of the union for a given profit level of the incumbent as

$$\Lambda(\pi_1) = \begin{cases} R_1^M - \pi_1 & \text{for } 0 \leq \pi_1 \leq R_1^M - \tilde{w}\eta_1 \\ R_1^D - \pi_1 & \text{for } R_1^M - \tilde{w}\eta_1 < \pi_1 \leq R_1^D - \rho\eta_1. \end{cases} \quad (4)$$

We, therefore, obtain a non-convex bargaining problem if

$$R_1^D - \rho\eta_1 > R_1^M - \tilde{w}\eta_1 \quad (5)$$

holds. Condition (5) requires that the joint surplus under duopoly net of the wage bill at the reservation wage is strictly larger than the joint surplus under monopoly net of the wage bill at the limit wage. In those instances, the incumbent would be able to realize a larger payoff under duopoly than under monopoly if it had all the bargaining power.

If, to the contrary, Condition (5) does not hold, then the bargaining frontier is described by $L(\pi_1) = R_1^M - \pi_1$ for $0 \leq \pi_1 \leq R_1^M - \tilde{w}\eta_1$. In that case, we obtain a convex bargaining problem. In the former case, however, we have to use lotteries to “convexify” the bargaining frontier. We do this by allowing for bargaining over a lottery $l = (\tilde{w}, \rho; p, 1-p)$ which chooses the limit wage, \tilde{w} , with probability $p \in [0, 1]$ and the reservation wage, ρ , with counter probability $1-p$. We assume that the union and the incumbent are risk-neutral.⁶

Using the lottery l , we can describe the convexified bargaining frontier by

$$L(\pi_1) = \begin{cases} R_1^M - \pi_1 & \text{for } 0 \leq \pi_1 \leq R_1^M - \tilde{w}\eta_1 \\ [p\tilde{w} + (1-p)\rho]\eta_1 & \text{for } R_1^M - \tilde{w}\eta_1 < \pi_1 \leq R_1^D - \rho\eta_1, \end{cases} \quad (6)$$

where the lottery fulfills

$$[p\tilde{w} + (1-p)\rho]\eta_1 = \tilde{w}\eta_1 - \frac{\tilde{w}\eta_1 - \rho\eta_1}{(R_1^D - \rho\eta_1) - (R_1^M - \eta_1\tilde{w})} \cdot [\pi_1 - (R_1^M - \eta_1\tilde{w})].$$

Applying the Nash bargaining solution to the convexified bargaining frontier (6) and noting the union’s disagreement payoff, $\rho\eta_1$, we obtain the following proposition which summarizes the bargaining outcome under an extension rule.

Proposition 2. *Suppose that an extension rule exists. If $R_1^D - \rho\eta_1 \leq R_1^M - \tilde{w}\eta_1$, then entry is deterred for sure and the Nash bargaining solution yields the generally binding wage rate*

$$\bar{w} = \begin{cases} \frac{1}{2} \frac{1}{\eta_1} (R_1^M + \rho\eta_1) & \text{for } R_1^M - \tilde{w}\eta_1 \geq \tilde{w}\eta_1 - \rho\eta_1 \\ \tilde{w} & \text{for } R_1^M - \tilde{w}\eta_1 \leq \tilde{w}\eta_1 - \rho\eta_1. \end{cases}$$

⁶By allowing for bargaining over lotteries and assuming von Neumann-Morgenstern expected utilities, our model fulfills the axioms of the Nash bargaining solution in expected terms. One may question whether bargaining over lotteries and the requirement to implement the ex post outcome of the lottery is a convincing image of real world wage bargaining. However, bargaining solutions which abstain from using lotteries are also problematic. For instance, Conley and Wilkie (1996) propose an extended Nash bargaining solution for nonconvex but comprehensible bargaining problems. Their approach is not applicable to our problem as the smallest comprehensible set of the bargaining frontier (4) has a jump at the limit wage \tilde{w} . Moreover, Conley and Wilkie’s proposed solution is not necessarily strictly Pareto-efficient (see Hougaard and Tvede 2010, for a solution which requires strict Pareto-efficiency but lacks a noncooperative implementation).

If $R_1^D - \rho\eta_1 > R_1^M - \tilde{w}\eta_1$, then the (expected) wage rate is given by

$$\bar{w} = \begin{cases} \frac{1}{2} \frac{1}{\eta_1} (R_1^M + \rho\eta_1) & \text{for } R_1^M - \tilde{w}\eta_1 \geq \tilde{w}\eta_1 - \rho\eta_1 \\ [p^* \tilde{w} + (1 - p^*)\rho] & \text{for } R_1^M - \tilde{w}\eta_1 \leq \tilde{w}\eta_1 - \rho\eta_1, \end{cases}$$

with $p^* = \left[1 + \frac{(\tilde{w}\eta_1 - \rho\eta_1) - (R_1^M - \tilde{w}\eta_1)}{R_1^D - \rho\eta_1}\right]^{-1}$, so that entry is deterred for sure or with probability p^* .

The first part of Proposition 2 follows directly from applying the split-the-surplus rule and taking notice of the corner solution. The second part of Proposition 2 follows from applying the split-the-surplus rule to the convexified problem. In particular, whenever the Nash solution requires to use a lottery, then the lottery must guarantee that the expected net joint surplus is shared equally which gives the condition

$$[p^* \tilde{w} + (1 - p^*)\rho] \eta_1 - \rho\eta_1 = p^* (R_1^M - \tilde{w}\eta_1) + (1 - p^*) (R_1^D - \rho\eta_1), \quad (7)$$

from which we obtain p^* as stated in Proposition 2.

We are now in a position to analyze how the parameters of our model affect the likelihood of a monopoly outcome where the union and the incumbent agree on a minimum wage which deters entry. From Proposition 1 we observe that deterrence for sure depends on the condition $R_1^M - \tilde{w}\eta_1 > \tilde{w}\eta_1 - \rho\eta_1$ being fulfilled. We can rewrite that condition as follows

$$f := (\tilde{w}\eta_1 - \rho\eta_1) - R_1^M + \tilde{w}\eta_1 = \frac{2\eta_1}{\eta_2} \left(\frac{\alpha - 2\Delta}{3} \right)^2 - \rho\eta_1 - \left(\frac{\alpha}{2} \right)^2 < 0.$$

Differentiation of $f(\cdot)$ gives $\partial f / \partial \eta_1 > 0$, $\partial f / \partial \eta_2 < 0$ and $\partial f / \partial \Delta < 0$.

We can also examine the probability p^* of entry deterrence which we can rewrite as $p^* = (1 + f/g)^{-1}$ with

$$g := R_1^D - \rho\eta_1 = \left(\frac{\alpha + \Delta}{3} \right)^2 - \rho\eta_1.$$

Differentiation of $g(\cdot)$ yields $\partial g / \partial \Delta > 0$ and $\partial g / \partial \eta_1 < 0$. It is now straightforward to establish the following corollary.

Corollary 1. *Deterrence of the entrant for sure becomes more likely and the probability of a limit wage, p^* , increases, whenever the cost efficiency or the network efficiency of the entrant decreases (i.e., Δ or η_2 increases, resp.) or the network efficiency of the incumbent increases (i.e., η_1 decreases).*

Clearly, a bargaining outcome with $\bar{w} \geq \tilde{w}$ becomes more likely for higher values of the entrant's marginal costs (Δ) and larger (lower) values of the network efficiency parameter η_2 (η_1). Inspection of the probability p^* which solves the split-the-surplus condition (7) in expected terms, shows that p^* (i.e., the probability of choosing \tilde{w}) increases as well when entry deterrence for sure becomes more likely. Interestingly, an increasing value of Δ and a decreasing value of η_1 which both shift the extremal point $R_1^D - \rho\eta_1$ of the bargaining set outward, induce the bargaining parties to settle on a higher probability of choosing \tilde{w} under the lottery solution. Hence, efforts of the entrant to enhance its cost efficiency would result in a lower probability of entry (we come back to a similar phenomenon below in Section 4, where we study the entrant's incentives to invest into the coverage of its mail delivery network).

We now ask whether entry deterrence can occur for sure even when the entrant is more efficient. Let us assume for a moment that both firms have the same network efficiency (i.e., $\eta_1 = \eta_2$). To simplify, let us also assume that workers' reservation wage takes the value of zero. Entry deterrence then occurs for sure if

$$2 \left(\frac{\alpha - 2\Delta}{3} \right)^2 - \left(\frac{\alpha}{2} \right)^2 \leq 0 \text{ or } \Delta \geq \frac{\alpha(2 - 3/\sqrt{2})}{4} < 0.$$

Hence, for all $\Delta \in [\alpha(2 - 3/\sqrt{2})/4, 0)$ wage bargaining under an extension rule induces deterrence of a more cost efficient rival.

Let us next assume that both firms have the same cost efficiency (i.e., $\Delta = 0$) but may differ in their network efficiencies (η_1, η_2). Again, setting the reservation wage to zero, we then obtain the following condition for entry deterrence for sure:

$$\frac{2\eta_1}{\eta_2} \left(\frac{\alpha}{3} \right)^2 - \left(\frac{\alpha}{2} \right)^2 \leq 0 \text{ or } \frac{\eta_2}{\eta_1} \geq \frac{8}{9}.$$

Hence, with an extension rule existing, an incumbent can deter a rival operator with a more efficient delivery network if $\eta_2/\eta_1 \in (8/9, 1]$ holds. We summarize those results in the following corollary.

Corollary 2. *Suppose $\rho = 0$. If $\eta_2/\eta_1 = 1$, then a more cost efficient entrant is deterred from entry for sure for all $\Delta \in [\alpha(2 - 3/\sqrt{2})/4, 0)$. If $\Delta = 0$, then an entrant with a more efficient network is deterred from entry for sure for all $\eta_2/\eta_1 \in (8/9, 1]$. Moreover, when the bargaining parties use a lottery to share their expected joint surplus, then deterrence of a more efficient entrant always occurs with some strictly positive probability.*

Comparison of labor market regimes. Comparing the wage rate agreed upon when no extension rule is in place with the case where an extension rule obliges the entrant to pay the minimum wage, we arrive at the following result.

Corollary 3. *The (expected) wage rate under a regime with an extension rule is strictly larger when compared with a regime where no such rule exists. Moreover, the union's (expected) wage bill and the incumbent's (expected) profit are both strictly larger under an extension rule.*

Corollary 3 shows that the usually assumed conflict of interest between a firm and its union in wage bargaining may be absent in the presence of market entry, whenever the wage rate can be used to raise rivals' costs. In contrast to deterrence models where the deterrence instrument (as, e.g., sunk costs in Dewatripont 1987) differs from the rent-sharing instrument, a minimum wage which combines both functions in a single instrument partly eliminates the supposed conflict. The reason for this result is that the firm may want to deter entry through a relatively large minimum wage which is also in the interest of the union. However, the conflict of interest does not disappear completely as the firm tries to pocket as much as possible from the monopoly rents.

We conclude the analysis of our model with some remarks on overall productive efficiency as measured by unit costs. We compare the labor market regime without an extension rule with the labor market regime with an extension rule. We focus on the case that entry is deterred for sure if an extension is in place. Unit mail cost when no extension rule is in place is given by

$$\frac{cx_1^* + (c + \Delta)x_2^* + \eta_1\hat{w}_1 + \eta_2\rho}{x_1^* + x_2^*}. \quad (8)$$

If an extension rule exists, unit mail costs are equal to

$$\frac{cx_1^M + \eta_1\bar{w}}{x_1^M}. \quad (9)$$

Inspection of both expressions (8) and (9) reveals the basic trade-off of an extension rule in terms of unit mail costs. As is well-known duplication of fixed costs under duopoly tends to make a monopoly outcome more attractive. However, a monopoly outcome under an extension rule has three main drawbacks: first, it reduces total mail volume ($x_1^* + x_2^* > x_1^M$), second, it increases wage demands by the union of the incumbent firm ($\bar{w} > \hat{w}_1 > \rho$), and third, it may deter a more efficient rival from entering the market. Taking those effects together a duopoly

outcome might be very well more desirable, even in an industry exhibiting features of a natural monopoly.

To show that overall mail unit cost can be smaller under duopoly in the absence of an extension rule, let us shortly analyze the case of $\Delta = 0$, so that $x_1^* = x_2^*$. Using expressions (8) and (9) we obtain the condition

$$\rho \left(\eta_2 - \frac{1}{6} \eta_1 \right) < \frac{\alpha^2}{9}$$

which assures that mail unit costs are smaller under duopoly when compared with a labor market in which an extension rule allows the union and the incumbent to settle on an entry deterring minimum wage. Clearly, such an outcome is more likely the higher the relative network efficiency of the entrant.

4 Endogenous Coverage

Until now we assumed that both firms compete head-to-head in the mail delivery market. Both firms were supposed to provide full coverage and the efficiency levels of their delivery networks were given exogenously. In reality, however, the decision about the coverage of a firm's delivery network should be endogenous (see Valletti et al. 2002). Because of universal service regulation the incumbent may not have the choice to reduce its coverage below full coverage. Accordingly, we suppose that the incumbent must provide a full coverage delivery network. We assume that the entrant firm, however, can decide freely about the coverage of its delivery network.

We abstract from any efficiency differences between both firms. We assume $\Delta = 0$ and we suppose that the fixed costs of running the mail delivery network are a linear function of each firm's coverage, $s_i \in [0, 1]$. The incumbent is assumed to have full coverage with $\eta_1 = \eta$, while the entrant can choose its coverage level, so that $\eta_2 = \eta s_2$.

We assume that the mail demand schedule $X = a - p$ is the aggregate of a continuum of symmetric delivery markets with total mass of one. Suppose now that the entrant serves the fraction s_2 of all markets. Then the fraction s_2 of all delivery markets are served by both the entrant and the incumbent, while the remaining fraction $1 - s_2$ is only served by the incumbent. For expositional purposes, we suppose that the incumbent can discriminate between the duopolistic delivery markets and the markets where it holds a monopoly position.

Given the entrant enters the market in the final stage of the game with a coverage of s_2 , the inverse demand in the duopoly delivery markets is given by $p^D = a - (1/s_2)(x_1 + x_2)$. Accordingly, the inverse demand in the monopoly segment is given by $p^M = a - [1/(1 - s_2)]y_1$, where x_i ($i = 1, 2$) denotes the firms' mail volume levels in the duopoly segment and y_1 stands for the incumbent's mail volume in the monopolistic segment.

Solving for the optimal quantities in the duopoly segment we obtain $x_1^* = x_2^* = s_2(\alpha/3)$ which gives rise to net revenues of $s_2 R^D$ for each firm. Accordingly, we obtain for the monopoly segment the optimal output level $y_1^M = (1 - s_2)(\alpha/2)$ which leads to net revenues of $(1 - s_2)R_1^M$ for the incumbent firm.

We suppose that the entrant firm must incur sunk costs to build up a delivery network in an initial stage before the above analyzed two-stage game starts. We specify that the costs to build up a delivery network with coverage s_2 are given by the investment function $K(s_2) = s_2^\epsilon$ with $\epsilon > 1$. Note that $1/\epsilon$ measures the (constant) cost elasticity of coverage. Hence, a one percentage increase of investment cost leads to a percentage increase of coverage below one per cent.

We are now in a position to fully analyze a three-stage game, where the entrant chooses its coverage in the initial stage while the next two stages remain the same as before.

We first analyze the case without an extension rule. In this case, the entrant firm solves the problem

$$\max_{s_2 \in [0,1]} s_2(R^D - \rho\eta) - s_2^\epsilon$$

from which we obtain the subgame perfect coverage decision of the entrant firm given by

$$s_2^* = \begin{cases} \left[\frac{1}{\epsilon} (R^D - \rho\eta) \right]^{\frac{1}{\epsilon-1}} & \text{if } \epsilon > R^D - \rho\eta \\ 1 & \text{if } \epsilon \leq R^D - \rho\eta. \end{cases} \quad (10)$$

Clearly, a full coverage outcome becomes more likely, the larger the marginal rents of investment, $R^D - \rho\eta$, and the larger the cost elasticity of coverage, $1/\epsilon$.

We next turn to the case when an extension rule makes the wage contract between the incumbent and the union generally binding. We first observe that the limit wage is independent of the entrant's coverage decision. As investments into the build-up of the delivery network constitute sunk costs, the limit wage fulfills $s_2 R^D - \eta s_2 \tilde{w} = 0$ which holds for all $s_2 > 0$ if and only if $\tilde{w} = (1/\eta)R^D$. A sufficient condition for an entry deterrence outcome is (see Proposition

2)

$$R_1^M - \tilde{w}\eta \geq s_2 R^D + (1 - s_2) R_1^M - \rho\eta. \quad (11)$$

In those instances, the incumbent could realize a larger surplus under an entry deterring wage than under the duopoly outcome at the workers' reservation wage if it had all the bargaining power. Such an outcome becomes the more likely the larger the entrant's coverage becomes as the right-hand side of (11) is monotonically decreasing in s_2 . The condition is, however, never binding, whenever

$$\rho\eta < 2R^D - R_1^M \quad (12)$$

holds. Incidentally, if Condition (12) holds, then the Nash bargaining solution always requires to use a lottery to resolve the negotiations between the incumbent and the union.⁷ We, therefore, obtained the following lemma.

Lemma 1. *If $\rho\eta \geq 2R^D - R_1^M$, then entry is deterred for sure and the entrant does not invest into building up a mail delivery network. If, to the contrary, $\rho\eta < 2R^D - R_1^M$ holds, then entry is deterred with probability p^* for all $s_2 \in [0, 1]$.*

Lemma 1 highlights the power of minimum wages as a deterrence instrument. Given that workers' reservation wage, ρ , and/or the labor-intensity of operating the mail delivery network, η , is relatively high, then an entrant firm will never build up a delivery network if an extension rule is enforced. Comparison with the entrant's optimal coverage decision in the absence of an extension rule (10) shows that there can exist instances in which the entrant would have otherwise build up a full coverage delivery network.

By Lemma 1, the entrant only invests into a delivery network if Condition (12) holds which implies that the incumbent and the union revert to a lottery to resolve their wage negotiations.

The entrant's maximization problem then becomes

$$\max_{s_2 \in [0, 1]} (1 - p^*) [s_2(R^D - \rho\eta)] - s_2^\epsilon, \text{ with } p^* = \left[1 + \frac{(\tilde{w}\eta - \rho\eta) - (R_1^M - \tilde{w}\eta)}{s_2 R^D - \rho\eta} \right]^{-1}. \quad (13)$$

Note that $\partial p^* / \partial s_2 > 0$, so that the probability of an entry deterring wage increases in the entrant's coverage. Differentiation of the entrant's profit function (13) with respect to s_2 yields

⁷By Proposition 2, we know that the Nash bargaining solution chooses a point on the convexified part of the bargaining frontier if $R_1^M - \tilde{w}\eta < \tilde{w}\eta - \rho\eta$ which is equivalent to $\rho\eta < 2R^D - R_1^M$. Hence, if $\rho\eta < 2R^D - R_1^M$, then Condition (11) is never fulfilled for all $s_2 > 0$.

the first-order condition for an interior solution

$$\left(1 - p^* - s_2 \frac{\partial p^*}{\partial s_2}\right) (R^D - \rho\eta) = \epsilon s_2^{\epsilon-1}, \quad (14)$$

where the left-hand side is the marginal rent of investment. The left-hand side of Condition (14) is clearly smaller than the marginal rent of investment in the absence of an extension regulation (which is equal to $R^D - \eta\rho$). Two reasons are responsible for this result: first, successful entry only occurs with some probability $1 - p^* < 1$, and second, the bargaining parties react to an increase of the entrant's coverage by increasing the probability of an entry deterring wage (i.e., $\partial p^*/\partial s_2 > 0$).

Denote the solution to the maximization problem (13) by s_2^{**} and let us focus on interior solutions, s_2^* , when no extension rule exists. The following proposition is then immediate.

Proposition 3. *If $\rho\eta \geq 2R^D - R_1^M$, then the entrant does not invest into building up a delivery network under an extension rule. If, to the contrary, $\rho\eta < 2R^D - R_1^M$ holds, then the entrant invests strictly less under an extension rule when compared with the investment level s_2^* for $\epsilon > R^D - \rho\eta$ in the absence of an extension rule; i.e., $s_2^{**} < s_2^*$.*

Proposition 3 makes clear that for a large enough reservation wage bill, $\rho\eta$, an entrant will never invest into building up its own delivery network irrespectively of its investment cost function $K(s_2)$. Moreover, if investments take place, then the entrant will enter with a network which entails a smaller coverage when compared with the case without an extension rule. Overall, having analyzed a richer model with endogenous coverage we are left with the observation that minimum wage legislation unfolds additional adverse dynamics effects on the entrant's willingness to invest into the coverage of its own mail delivery network.

In the next sections we relate our analysis to recent minimum wage legislation in Germany. We first describe the relevant labor laws which implement minimum wages at the industry-level. We then examine the Deutsche Post case which highlights the raising rivals' cost incentives when labor laws exist which make the collective wage agreement between incumbents generally binding. Our investigation of that case shows that the main predictions of our model mirror nicely what actually happened in reality.

5 The German Collective Bargaining System

In this section we shortly describe the legal foundations of the German system of collective bargaining. We describe the traditional procedure of declaring wage contracts generally binding by means of extension regulation. We then describe most recent minimum wage legislation which has significantly increased the scope for making wage contracts generally binding.

The legal basis of collective bargaining. In Germany wage bargaining occurs mainly at the sectorial level between an industry union and an employer association representing most of the firms in the industry.⁸ Those collective negotiations usually result in standard wages and labor contracts which cover almost all firms and workers in the industry. This so-called area tariff system (“Flächentarifsystem”) still dominates the German labor market. As has been argued by Haucap et al. (2006, 2007) the stability of the area tariff system in Germany is mainly externally supported by various labor market regulations which systematically protect the collective bargaining system against deviant behavior and outside competition.

One core institution of the German system of collective bargaining is the so-called tariff autonomy (“Tarifautonomie”) which empowers unions, employers and employer associations to form coalitions and to bargain collectively.⁹ The principle of tariff autonomy protects the “social partners” to strike collective agreements on their own and, with that, makes outright minimum wage setting through state intervention virtually impossible.

The legal nature of the collective bargaining process is specified in the Collective Agreements Act (“Tarifvertragsgesetz”, in short: TVG). According to the TVG only the tariff parties (unions, firms, and employer associations) can conclude collective labor contracts. Most unions (as the united services union - “Vereinigte Dienstleistungsgewerkschaft”, in short: Verdi) are organized within the German confederation of trade unions (“Deutscher Gewerkschaftsbund”, in short: DGB). While there is no doubt that all unions which are members of the DGB have the right

⁸Labor markets and labor laws differ substantially between countries (see, e.g., Nickell 1997, OECD 1997, or Blau and Kahn 1999). A salient dimension that differentiates national labor markets is the degree of wage setting centralization (Calmfors and Driffill 1988 and Wallerstein 1999). From this angle Germany’s collective wage bargaining system is somehow positioned in the middle between a decentralized system (with collective bargaining at the firm level) and a fully centralized system (with collective bargaining at the national level).

⁹The legal grounds for the tariff autonomy can be found in Article 9 Paragraph 3 of the German Constitution (“Grundgesetz”) and the law concerning tariff agreements (“Tarifvertragsgesetz”).

to conclude tariff agreement, this is typically not the case for outsider unions.¹⁰ In fact, as summarized in Haucap et al. (2006, pp. 365ff.) legal practice and the legal literature have arranged extremely restrictive conditions which have to be fulfilled so that a worker association should be regarded as eligible to conclude collective agreements (see Wiedemann and Stumpf 1977, pp. 357ff.).¹¹

The TVG states that in general only members of the bargaining parties are actually bound to obey the regulations of the tariff contract. In practice, though, a firm which is member of an employer association pays the tariff wage to all of its employees (for the reasons see Haucap et al. 2006, p. 363).

Traditional extension rule. While there are many stabilizers of the area tariff system, a stabilizer of last resort is provided by the possibility to make collective bargaining contracts compulsory for all unorganized employers (and hence, all unorganized workers) within an industry by an extension rule. Specifically, paragraph 5 of TVG provides the bargaining parties with such a device, the so-called “Allgemeinverbindlicherklärung” (in short: AVE). The first prerequisite to declare an employment contract to be generally binding is the existence of a collective bargaining agreement in accordance with TVG; i.e., a collective contract between a union and an employer association at the industry level. Secondly, at least 50 per cent of employees in the tariff area for which an AVE is initiated have to be employed in firms of contract-bound employers and the AVE must be “in the public interest”.

The implementation of the AVE is regulated in the TVG. Initially, one of the bargaining parties must apply for an AVE at the Ministry of Labor. Unorganized employees and employers concerned, as well as employer associations, unions and the Ministry of Labor of the state affected by the AVE are given the right to express their opinion. Afterwards a public hearing of

¹⁰The case of the Christliche Gewerkschaft Metall (CGM) which is a member of the Christliche Gewerkschaftsbund (CGB) is instructive in this regard. Ever since its appearance, the dominant union Industriegewerkschaft Metall (IGM) (which is member of the DGB) has continuously tried to challenge the right of the CGM to strike collective agreements (see Haucap et al. 2006).

¹¹An exceptionally restrictive condition is the so-called mightiness (“social power”) requirement which unfolds a vicious circle that ultimately counters attempts to establish a new rival union. According to the Federal Labor Court an indication for the existence of social power comes from the fact whether the union already concluded collective agreements. Obviously, the incumbent union meets this requirement but a new union can hardly refer to collective contracting in the past.

a council consisting of three representatives of umbrella organizations of unions and employers respectively (“Tarifausschuss”) is initiated. The council then decides with the majority of votes whether or not to recommend the use of an AVE to the Ministry of Labor. Though the Ministry of Labor is not bound by the council’s recommendation, it nevertheless has proved to affect the ministry’s final decision. Once an AVE has been put into force, it remains effective until the collective bargaining contract expires or the Ministry of Labor puts the AVE out of force.

Posted Workers Act. The Posted Workers Act (“Arbeitnehmer-Entsendegesetz”, in short: AEntG) came into force in 1996 and has been revised several times later on (the latest version dates back to April 20th, 2009). Its original objective was to ensure binding labor standards for workers employed by businesses of foreign origin (with a focus on construction workers). Yet, right from the beginning it was clear that the act could also be used to force all employers (including nonorganized domestic firms) in a certain sector to adhere to the same working standards and, in particular, minimum wages. In fact, as of today the Act’s main purpose has become to enforce minimum wages in several service sectors on domestic firms.

The Posted Workers Act reduced significantly the bar for the German Federal Ministry of Labor to implement minimum wages when compared with the traditional extension rule according to the TVG. First, it allows to declare a collective wage contract generally binding even if less than 50 per cent of the employees of the tariff area concerned are employed by contract-bound firms.¹² Second, until 2009 the Act did not require a public hearing of a council consisting of the involved umbrella organizations.¹³ Finally, the Ministry of Labor can declare a wage contract generally binding by legal decree (“Rechtsverordnung”) without having to go through a complicated procedure as required under the TVG.¹⁴

The Act does not apply automatically to all service sectors. Instead, the Act explicitly

¹²In the latest version of the Posted Workers Act a representativeness requirement was introduced which applies to those industry where competing collective labor contracts exist. A collective contract is more “representative” if both the number of workers employed by contract-bound employers and the number of union members affected by the tariff agreement are larger (see also Blanke 2007).

¹³In its latest version of 2009, the Posted Workers Act was supplemented by a paragraph which requires the Ministry of Labor to ask the involved bargaining parties as well as the parties of competing collective agreements (if applicable) for their statements.

¹⁴For example, under the TVG the Labor Ministry of a Land can block an AVE in which case the Federal Ministry of Labor must ask the Federal Government for permission.

states the sectors which can apply for a minimum wage ruling. Initially, the Act only mentioned the construction industry. By the end of 2007 (shortly before full liberalization) mail delivery services and, most recently, several other sectors have been added (as, e.g., commercial cleaning and waste management).

6 The Deutsche Post Case

In Germany, the transition period towards full liberalization started on January 1st, 1998 with the implementation of the first EU Directive (97/67/EC) on postal service markets.¹⁵ Initially, it was planned to liberalize the postal service market fully on January 1st, 2003. However, prior to that date, Germany's Federal Government decided to renew Deutsche Post's monopoly for letter services for five more years. At the latest, in winter 2006/2007 it became clear that the then ruling Federal Government was committed to liberalize the postal service market fully on January 1st, 2008.

In the following we first describe the road towards the introduction of minimum wages in the postal sector in Germany just prior to full liberalization. Then, we describe how the minimum wages affected competitors' businesses and we touch on the legal disputes which followed.

The road towards minimum wages. With full liberalization of the postal market in prospect, labor unions (in particular, Verdi) and several political parties called for the introduction of minimum wage legislation in the postal service sector. It was claimed that wage dumping at the expense of established postal workers should be prevented this way.¹⁶

Prior to liberalization, Deutsche Post had significantly restructured operations; e.g., through outsourcing of post offices and transport services, while the mail delivery network has been kept inhouse. At that time, virtually all operators who entered the not reserved area provided end-to-end services, many of them at a local or regional level, competing with Deutsche Post through alliances. Until full liberalization in 2008, the reserved area included letters up to 50 grams

¹⁵In the EU, the stepwise liberalization process of the market for postal services is governed by three EU Directives; namely, Directive 97/67/EC, Directive 2002/39/EC, and Directive 2008/06/EC, where the latter one requires the member states to abolish any remaining reserved areas by 2010.

¹⁶The release of a study on the allegedly precarious employment conditions at the postal service competitors triggered an intense debate about this issue (Input Consulting 2006).

(with some exceptions for large senders). Competition that emerged prior to 2008 was mainly in the area of value-added services as little requirements had to be fulfilled to operate outside the reserved area (Dieke and Wojtek 2008). Deutsche Post claimed that its disadvantage of having relatively high wages due to the former legal status of its employees as civil servants requires the implementation of minimum wage legislation in order to ensure a level playing field.

In August 2007, the Federal Government (consisting of a grand coalition) reached an agreement to support the introduction of minimum wages in the postal sector via amendment of the Posted Workers Act.¹⁷ The exact details, however, were left open until the end of 2007. Given the political support for minimum wages, a series of strategic moves by the involved parties followed quickly.

On August 28th, 2007 the Postal Employer Association (Arbeitgeberverband Postdienste, in short: AGV Postdienste) was established. It was obvious that the AGV Postdienste was dominated by the Deutsche Post and its subsidiaries.¹⁸ At that time the competitors proclaimed that the establishment of AGV Postdienste was a strategic move to implement excessive minimum wages in order to drive them out of the market after full liberalization.

On September 4th, 2007 the newly founded AGV Postdienste and Verdi reached a collective wage agreement which was intended to serve as the reference contract for minimum wages in the postal service sector.¹⁹ Accordingly, the contract was filed to the Federal Ministry of Labor to be declared generally binding. The tariff contract stipulated a general minimum wage per hour of € 8.00 and € 8.40 in East Germany and West Germany, respectively. Specifically, the minimum wage for mail delivery was set even higher at € 9.00 and € 9.80 in East Germany and West Germany, respectively. The contract stipulates that those minimum wages should become effective on December 1st, 2007.²⁰ However, the contract provides an extraordinary termination

¹⁷See “Bundesregierung beschließt Mindestlohn für Brief-Branche,” 22 August, 2007 (www.post-und-telekommunikation.de).

¹⁸At court hearings in 2009, the most important competitors claimed that they did not have the opportunity to join the association or to take part in the negotiations. See German Parliament, Commission for Labor and Social Affairs, meeting protocol 16/65, statement of F. Gerster, p. 875.

¹⁹The contract is posted on the website of AGV Postdienste (www.agv-postdienste.de).

²⁰See “Mindestlohn im Postbereich vereinbart,” Handelsblatt online (www.handelsblatt.com). The tariff contract was signed on 29 November, 2007 (www.verdi.de).

clause which becomes effective if and only if the contract is not declared generally binding as an industry-wide minimum wage.²¹

To investigate the actual working conditions in the postal industry, the Federal Network Agency (“Bundesnetzagentur”) conducted a survey about working conditions at licensed postal service operators from summer to autumn 2007 (BNetzA 2008). Table 1 provides an overview of the results concerning the prevailing wages.

Table 1: Industry wages before the introduction of the minimum wage (BNetzA 2008)

	Deutsche	Competitors		
	Post AG	West	East	Average
Sorters	11.34	8.10	6.11	7.68
Drivers	11.99	8.08	6.23	7.73
Delivery postmen	12.13	7.71	6.18	7.28
Administrative staff	16.01	11.24	9.23	10.97
Average	13.04	8.23	6.38	7.79

Focusing on wages per hour for postmen, Table 1 clearly shows that the tariff agreement between AGV Postdienste and Verdi set minimum wages which exceeded the average wage rates paid by competitors by 20-30 per cent. The average wage rate of € 12.13 calculated for the Deutsche Post should be treated with caution. This relatively high wage rate mirrors on the one hand Deutsche Post’s burden of having senior postmen who still enjoy the benefits of civil servant status or similar working contracts. However, the wage rate Deutsche Post’s partner firms have been paying for new employees (including postmen) are substantially lower and have been even lower than the minimum wage set in the tariff contract between AGV Postdienste and Verdi.²²

Needless to say, the competitors immediately complained heavily about the high wage levels and the procedure how the tariffs have been agreed upon. Another issue was the coverage

²¹Precisely, article 6, paragraph 3 of the tariff contract stipulates: “Both parties have an extraordinary termination right if the contract is not declared generally binding according to the Collective Agreements Act and the Posted Workers Act. In that case [...] the contract can be terminated within a period of one week by the end of the calendar month.”

²²For details, see BNetzA (2008) and Dieke and Zauner (2007).

of the tariff agreement. Initially, it was planned that the tariff agreement should hold for all firms delivering letters no matter of the firms' core business (as, e.g., publishing and newspaper delivery). By November 29th, 2007 the draft of the wage contract was revised such that it only applied to firms with letter delivery being their core business.²³

The main competitors responded on September 18th, 2007 with the establishment of a new employer association "Arbeitgeberverband Neue Brief- und Zustelldienste" (in short: AGV Neue BuZ) which immediately claimed, a minimum wage would be reasonable and acceptable if it was between € 6.00 and € 7.50.²⁴

In the mean time, a new union for new letter and delivery services (Gewerkschaft Neue Brief- und Zustelldienste, in short: GNBZ) was founded which concluded a wage contract with the new employer association AGV Neue BuZ which stipulated a general minimum wage per hour of 6.50 € and 7.50 € for East Germany and West Germany, respectively. That contract was also submitted to the Federal Ministry of Labour to serve as an alternative proposal for a mandatory minimum wage.²⁵

Market surveys conducted by the Federal Network Agency revealed that the introduction of a minimum wage by means of the extension rule of the TVG would be problematic, as the wage contract between AGV Postdienste and Verdi hardly represented at least 50 per cent of the employees in postal delivery services that had to be employed in firms of contract-bound employers according to the TVG.²⁶

Hence, a minimum wage would critically depend on a revision of the Posted Workers Act by adding letter delivery services to the sectors eligible for a minimum wage regulation. On December 20th, 2007 the amended Act (BMAS 2007) which now included letter services, was passed by the Upper House ("Bundesrat"). On December 28th, 2007 a decree was issued by the Federal Labor Ministry, declaring the wage contract between Verdi and AGV Postdienste generally binding for all mail service providers. The decree became effective on January 1st, 2008 and was set to expire by April 31st, 2010.

Impact on competition. The extension of the wage contract between Verdi and AGV

²³See "Koalition einigt sich auf Post-Mindestlohn," Spiegel online, November 29th, 2007 (www.spiegel.de).

²⁴See Press Release of the AGV Neue BuZ, 27 September, 2007 (www.agv-nbz.de).

²⁵See BdKEP Press Release, 12 December, 2007 (www.bdkep.de).

²⁶See BNetzA (2008).

Postdienste by means of the Posted Workers Act had a strong and lasting impact on the competitors' businesses. Overall, the minimum wage is widely considered as detrimental to the development of competition in the German mail market. According to a statement of the German Federal Government, 153 postal service companies shut down operations in 2008-2009 and about 19.000 jobs had been cut.²⁷

In the first quarter of 2008, the PIN group filed insolvency after its main shareholder, the Axel Springer group, had withdrawn of its postal operations already in December 2007. Since then the PIN group has been run by an insolvency administrator. It paid the minimum wage while being subsidized out of public social security funds (Ecorys 2008). In the first quarter 2008, about 50 per cent of formerly about 11,400 jobs have been slashed, so that the delivery network has been cut down substantially (already in February 2008, 37 of approximately 91 companies of the PIN group filed bankruptcy). While the insolvency administrator tried to preserve the PIN group as a whole, it later turned out, that a more viable solution was to sell the different regional companies separately. The publishing house Holtzbrinck bought twelve PIN firms in metropolitan areas. In mid-sized cities regional publishers took over several other PIN firms. Subsidiaries of PIN in smaller towns and rural areas often could neither be preserved nor sold to other firms and had to shut down operations all together.

Turning to the other main competitor TNT, the picture is somewhat different. Right after the introduction of minimum wages, TNT announced that it is seriously considering withdrawal from the German market as a consequence of the minimum wage. Interestingly, TNT decided not to pay the minimum wages but kept its own lower wage rates effective. This decision, though, did also put an additional financial burden on the company as it had to build up reserves for the wage differential and associated social security contributions. However, shortly after the Federal Administrative Court's judgement that the minimum wages are void TNT announced new plans to extend its area coverage and delivery frequency.

Finally, as competing postal operators relied on building alliances with partner firms to reach nearly full geographic coverage, market exit of small regional players has resulted in reductions

²⁷See the reply of the Federal Government to the inquiry of the parliamentary group of the liberal party (FDP) (available at <http://dip21.bundestag.de/dip21/btd/16/091/1609192.pdf>) and Press Release of the Federal Network Agency (available at <http://www.bundesnetzagentur.de/media/archive/15280.pdf>).

of the main competitors coverage. For example, it is documented in Ecorys (2008) that as a consequence of partner insolvency, the coverage of the TNT network went down from 93 to 87 per cent in Germany.²⁸

Legal disputes. With the implementation of minimum wages a series of legal disputes have been triggered which are not fully settled until today. On January 9th, 2008, TNT and other competitors (organized in the new employer association AGB Neue BuZ) filed a lawsuit against the German Federal Government. They insisted on their constitutional right to conclude a collective wage agreement on their own (namely, the tariff contract concluded in 2007 between the AGV Neue BuZ and GNBZ).²⁹ On March 7th, 2008, the Berlin Administrative Court (“Verwaltungsgericht”) declared the minimum wage void. The court argued that the Federal Government was not empowered by the Posted Workers Act to overturn a competing collective contract by declaring another collective tariff contract generally binding. By that, the court clarified that a minimum wage can only be imposed on employers and workers not bound by any tariff agreement.³⁰

The Federal Labor Ministry appealed and on January 28th, 2010, the Federal Administrative Court (“Bundverwaltungsgericht”) finally judged the declaration of the minimum wage void due to formal defects. In its decision the court argued that the Federal Labor Ministry had failed to give other affected parties the opportunity to comment prior to issuing of the ordinance. As a consequence, the minimum wage immediately was not binding anymore for the plaintiffs, while

²⁸Meanwhile, by January 2010, TNT, Holtzbrinck, Madsack, Citipost and some other companies in the mailing industry founded the Mail Alliance which started operations on January 25th, 2010. Their offerings are limited to firms and institutions, but include hybrid mail. Coverage is claimed to be nation-wide with a conveyance speed of E+2. The wages paid by the companies of the alliance are mainly in the range of € 6.50 to € 7.50 (see the Mail Alliance’ website: www.mailalliance.net).

²⁹At the EU level, the Federal Association of International Express and Courier Companies (“Bundesverband Internationaler Express- und Kurierdienste”) filed a complaint addressed to the European Commission. It was argued that the minimum wage agreement’s only objective was to block competition. In addition, TNT filed a complaint against the German government based on Art. 82 of the European Treaty. It was claimed that the minimum wage decree leads to an unfair infringement on competition and violates the freedom to establish business throughout the European Union by raising rivals’ costs. The European Commission’s DG Internal Market announced to examine the issue.

³⁰See Berlin Administrative Court (2008): Decision VG 4 A 439.07.

it remained in force for unorganized competitors.

There is, however, still uncertainty whether the minimum wage decree is valid from its beginning. To make things even more complicated on February 13th, 2009, a new amendment of the Posted Workers Act was put into force which should cure the Act's shortcomings when more than one collective contract has been concluded in the same sector. First, the amendment specifies a new "representativeness" criterion which should guide the Federal Labor Ministry's decision which tariff contract to select as the basis for an extension rule when more than one collective contract exist. Second, the amendment incorporates a procedure of hearings of the affected parties into the Act which was missing in the former version. Those amendments have been acknowledged by legal experts as sufficient to guarantee that a minimum wage based on the collective contract between Verdi and AGV Postdienste could stand the test of a labor court (see Blanke 2007).

The new amendment is closely related to Verdi's accusation that the new union GNBZ is not empowered to conclude collective labor contracts. Verdi argued that the GNBZ does not meet the minimum standards a "tariff-enabled" union must fulfill according to the TVG.³¹ On October 30th, 2008 the Cologne Labor Court ("Arbeitsgericht") denied that the GNBZ is a tariff-enabled union in the sense of the TVG. Accordingly, the wage contract between AGV Neue BuZ and GNBZ was declared as void by the court. This court ruling together with the Federal Government's political commitment to find ways to implement minimum wages has been inflicting considerable uncertainty on the viability of the competitors' future businesses. Both GNBZ and AGV Neue BuZ appealed against the court ruling, but in the meantime both parties withdraw their appeals.

7 Conclusion

In this paper we analyzed how minimum wage legislation in the form of extension rulings can be used by collective bargaining partners to deter entry or to drive existing competitors out of the market. Our main application is the postal service industry where the labor costs of running a

³¹See Blanke (2007) for an expert's report which argues that the new union should not be regarded as tariff-enabled according to the TVG. That study also argues that the "representativeness" criterion of the revised Posted Workers Act requires to neglect the competing collective agreement.

mail delivery network are mainly fixed operating costs. As it is the case in more standard raising rivals' costs models where wages affect a firm's marginal labor costs directly, wage increases can be used to monopolize the final product market. However, there are several differences between raising rivals' marginal and raising rivals' fixed labor costs. Most importantly, when labor constitutes fixed costs, then the profitability of a raising rivals' costs strategy does not depend on a sufficient efficiency advantage of the incumbent firm (which engages in the anticompetitive practice) vis-à-vis potential competitors. This observation has several implications. First, the alleged conflict of interest between the firm and its union becomes less pronounced as it is the case when wages are variable costs. When wages are variable costs a wage increase not only distributes rents to the union but also tends to reduce the overall joint surplus available because of the well-known double mark-up problem. Second, when wages are fixed costs then an incumbent is able to deter entry through strategic wage increases even if the entrant firm is more efficient. As a consequence, overall productive efficiency can be reduced under a raising rivals' fixed labor cost strategy.

We also showed that extension regulations may have adverse effects on competitors' willingness to invest into the coverage of their mail delivery networks. In the extreme case, entry is completely deterred under an extension rule while an entrant may build a mail network with full coverage when no such extension regulation exists.

The Deutsche Post case reveals the strong incentives of the incumbent firm and the established union (which cares only about its organized members employed by the incumbent) to settle (strategically) on a relative high wage rate so as to harm competitors. The strategic intention becomes obvious when one considers the fact that the tariff contract specifying the proposed minimum wages was made contingent on being declared generally binding by the Federal Government. As we have shown, both parties retained the right to terminate the agreement otherwise.

We also described recent legal disputes which resulted from the Federal Government's minimum wage ruling. The most problematic issue has become the fact that the incumbent unions (namely, the unions organized in the DGB) lost their monopoly position in the "market for collective contracts." This is a rather new development in the German labor market, and the labor institutions (which were designed for bilateral wage negotiations between a monopoly union and

a monopolistic employer association at the industry-level) are still struggling to come to terms with a competitive labor market.

References

- Armstrong, M. (2008), Access Pricing, Bypass and Universal Service in Post, *Review of Network Economics* 7, 172-187.
- Blanke, T. (2007), Die Tarifverträge im Briefdienstleistungsbereich und ihre Allgemeinverbindlichkeit, Gutachterliche Stellungnahme im Auftrag Arbeitgeberverband Postdienste, 21 December 2007, Oldenburg i.O.
- Blau, F.D. and Kahn, L.M. (1999), Institutions and Laws in the Labour Market, in: O. Ashenfelter and D. Card (eds.), *Handbook of Labour Economics*, Vol. 3, Amsterdam, Elsevier.
- BMAS (2007), Verordnung über zwingende Arbeitsbedingungen für die Branche Briefdienstleistungen, Federal Ministry of Labor and Social Affairs, BAnc No. 242, 28.12.2007, p. 8410.
- BNetzA (2008), Arbeitsbedingungen im lizenzierten Bereich, Endergebnis der Auskunftsanordnung gemäß §45 PostG vom 22.06.2007, Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen, February 2008, Bonn.
- Calmfors, L. and Driffill, J. (1988), Centralisation and Wage Bargaining, *Economic Policy* 6, 13-61.
- Conley, J.P. and Wilkie, S. (1996), An Extension of the Nash Bargaining Solution to Nonconvex Problems, *Games and Economic Behavior* 13, 26-38.
- Dewatripont, M. (1987), Entry Deterrence Under Trade Unions, *European Economic Review* 31, 149-156.
- Dewatripont, M. (1988), The Impact of Trade Unions on Incentives to Deter Entry, *Rand Journal of Economics* 19, 191-199.
- Dieke, A.K. and Wojtek, R. (2008), Competition, Wages and Politics in the Delivery Sector: The Case of Postal Minimum Wages in Germany, Mimeo.

- Dieke, A.K. and Zauner, M. (2007), Arbeitsbedingungen im Briefmarkt, WIK Discussion Paper No. 295, Bad Honnef.
- Dixit, A. (1979), A Model of Duopoly Suggesting a Theory of Entry Barriers, *Bell Journal of Economics* 10, 20-32.
- Ecorys (2008), Effect of Minimum Wage on Competitors in the German Postal Market, Report to the Ministry of Economic Affairs, Energy and Telecom, 7th April 2008, Rotterdam.
- Häckner, J. (2000), A Note on Price and Quantity Competition in Differentiated Oligopolies, *Journal of Economic Theory* 93, 233-239.
- Haucap, J., Pauly, U., and Wey, C. (2001), Collective Wage Setting When Wages Are Generally Binding: An Antitrust Perspective, *International Review of Law and Economics* 21, 287-307.
- Haucap, J., Pauly, U., and Wey, C. (2006), Collective Wage Bargaining in Germany as Viewed Through the Looking Glass of Competition Policy, in: U. Bindseil, J. Haucap, and C. Wey (eds.), *Institutions in Perspective: Festschrift in Honor of Rudolf Richter on the Occasion of his 80th Birthday*, Tübingen, Mohr-Siebeck, pp. 349-378.
- Haucap, J., Pauly, U., and Wey, C. (2007), A Cartel Analysis of the German Labor Institutions and its Implications for Labor Market Reforms, *Journal of Institutional and Theoretical Economics* 163, 503-516.
- Horn, H. and Wolinsky, A. (1988a), Bilateral Monopolies and Incentives for Merger, *Rand Journal of Economics* 19, 408-419.
- Horn, H. and Wolinsky, A. (1988b), Worker Substitutability and Patterns of Unionization, *Economic Journal* 98, 484-497.
- Hougaard, J.L. and Tvede, M. (2010), n-Person Nonconvex Bargaining: Efficient Proportional Solutions, MSAP Working Paper No. 02/2010, University of Copenhagen.
- Input Consulting (2006), Liberalisierung und Prekarisierung: Beschäftigungsbedingungen bei den neuen Briefdienstleistern in Deutschland, December 2006, Bonn.

- Kreps, D. and Scheinkman, J. (1983), Quantity Pre-Commitment and Bertrand Competition Yield Cournot Outcomes, *Bell Journal of Economics* 14, 326-337.
- Nash, J. (1950), The Bargaining Problem, *Econometrica* 18, 155-162.
- Nickell, S. (1997), Unemployment and Labour Market Rigidities: Europe Versus North America, *Journal of Economic Perspectives* 11, 55-74.
- OECD (1997), *Employment Outlook*, OECD, Paris.
- Rogerson, W.P. (1984), A Note on the Incentive for a Monopolist to Increase Fixed Costs as a Barrier to Entry, *Quarterly Journal of Economics* 99, 399-402.
- Salop, S.C. and Scheffman, D.T. (1983), Raising Rivals' Costs, *American Economic Review Papers and Proceedings* 73, 267-271.
- Salop, S.C. and Scheffman, D.T. (1987), Costs-Raising Strategies, *Journal of Industrial Economics* 36, 19-33.
- Valletti, T.M., Hoernig, S., and Barros, P.P. (2002), Universal Service and Entry: The Role of Uniform Pricing and Coverage Constraints, *Journal of Regulatory Economics* 21, 169-190.
- Vives, X. (1999), *Oligopoly Pricing: Old Ideas and New Tools*, Bosten, MA, MIT Press.
- Wallerstein, M. (1999), Wage-setting Institutions and Pay Inequality in Advanced Industrial Societies, *American Journal of Political Science* 43, 649-680.
- Wiedemann, H. and Stumpf, H. (1977), *Tarifvertragsgesetz mit Durchführungs- und Nebenvorschriften, Kommentar*, 5th ed., C.H. Beck'sche Verlagsbuchhandlung, München.
- Williamson, O.E. (1968), Wage Rates as a Barrier to Entry: The Pennington Case in Perspective, *Quarterly Journal of Economics* 82, 85-116.